

Appl. No. 10/769,030
Amdt. sent May 22, 2006
Reply to Office Action of January 24, 2006

PATENT

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

- 1 1. (Currently amended): A storage device ~~having a capability of learning~~
2 ~~access patterns,~~ comprising:
3 a control unit;
4 a cache memory; and
5 a disk device;
6 wherein said control unit records a data readout location in the disk device as a
7 ~~history for each computer of data readout activity for each computer among a plurality of~~
8 ~~computers connected to said storage device,~~ respectively reading out data from said storage
9 ~~device to specify one of said computers[[,]]~~ based on predetermined information, and then pre-
10 reads data to be used by ~~a computer~~ said one of said computers from said disk device to said
11 cache memory[[,]] based on a command containing information for specifying said history and
12 information for specifying said one of said computers, said pre-read data being determined in
13 ~~accordance with said history of data readout activity of said one of said computers~~ computer that
14 ~~uses said storage device.~~
- 1 2. (Original): A storage device according to claim 1, wherein said
2 predetermined information is for specifying said computer and for specifying said recorded
3 history, and
4 said control unit records said history as being linked with said information for
5 specifying said history and said information for specifying said computer and, when said
6 command containing said information for specifying said computer and said information for
7 specifying said history is received, reads data from said disk device to said cache memory, based
8 on said history linked with said information for specifying said computer and said information
9 for specifying said history contained in said command.

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1 3. (Original): A storage device according to claim 2, wherein said
2 predetermined information includes information on time, and said control unit records said
3 history as being linked with information for specifying said history and information for
4 specifying said computer until a predetermined time.

1 4. (Original): A storage device according to claim 3, wherein said
2 predetermined information includes information for specifying a data storage location of said
3 disk device, and said control unit records said history as being linked with said information for
4 specifying said history and said information for specifying said computer from a time when said
5 computer specified by said information for specifying said computer reads out data stored at a
6 data storage location of said specified disk device.

1 5. (Original): A storage device according to claim 4, wherein when a
2 command of stopping record of said history is received, the record of said history is stopped.

6. (Canceled)

1 7. (Original): A storage device according to claim 4, wherein an operating
2 system program to be used by said specified computer is stored in a location specified by the
3 information for specifying the data storage location of said disk device.

1 8. (Original): A storage device according to claim 6, wherein an operating
2 system program to be used by said specified computer is stored in a location specified by the
3 information for specifying the data storage location of said disk device.

1 9. (Original): A storage device according to claim 1, wherein the history is
2 arranged to be recorded in a form of a table specifying a relationship among a history ID, the
3 data readout location and the computer using the data having been stored in the location.

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1 10. (Currently amended): A system including a storage device having a disk
2 device and a cache memory, a management computer, and a plurality of computers connected to
3 said storage device, comprising:

4 said management computer for transmitting to said storage device a first
5 command containing information for specifying any one of said computers and information for
6 specifying a history of data readout activity;

7 said storage device for, when ~~the a~~ computer specified by said first command
8 reads out data from said storage device, reading a storage location of said data in said disk device
9 as a history ~~as being~~ that is linked with information for specifying said history of data readout
10 activity and information about said computer to be specified contained in said first command;

11 said management computer for transmitting to said storage device a second
12 command containing information for specifying any one of said plurality of computers and
13 information for specifying said history of data readout activity; and

14 said storage device for reading out data specified by said history of data readout
15 activity from said disk device to said cache memory, based on said second command received
16 from said management computer, said pre-read data being determined in accordance with said
17 history of data readout activity of said computer.

1 11. (Currently amended): A system according to claim 10-claim 9, wherein
2 said management computer includes information about a schedule of a designation to be
3 transmitted to said storage device by said computer itself, and said management computer
4 transmits said first command or second command to said storage device based on said schedule.

1 12. (Original): A system according to claim 10, wherein said management
2 computer designates said specified computer to start said specified computer itself after said
3 second command is transmitted to said storage device.

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1 13. (Currently amended): A read-ahead method to be executed in the a
2 storage device, comprising the steps of:
3 transmitting to said storage device a first command containing information for
4 specifying a first computer that uses from among a plurality of computers connected to said
5 storage device and a history of readout activity of said first computer to be used for to perform
6 said read-ahead;
7 in said storage device,
8 _____ recording a location where said data associated with said first command is
9 to be stored as a history as being linked with information for specifying said history and
10 information for specifying said first computer contained in said command when said specified
11 first computer reads out said data from said storage device; and
12 _____ transmitting a second command containing information for specifying said
13 first computer and information for specifying said history to said storage device;
14 in said storage device,
15 _____ pre-reading data from a recording medium included in said storage
16 device[,] based on said recorded history corresponding with said information for specifying
17 said first computer and said information for specifying said history contained in said second
18 command.

1 14. (Currently amended): A read-ahead method according to claim 13-claim
2 12, further comprising the steps of:
3 transmitting information about time to said storage device; and
4 recording said history until the time specified by said information about time in
5 said storage device.

1 15. (Currently amended): A read-ahead method according to claim 13-claim
2 12, further comprising the step of:
3 recording said history from a time specified by said information about
4 time in said storage device, based on said information about time.

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1 16. (Original): A system according to claim 10, wherein said management
2 computer classifies said plurality of computers into a plurality of groups when registering said
3 computers.

1 17. (New): A storage system comprising:
2 a plurality of computers; and
3 a storage device in data communication with each of said computers, said storage
4 device comprising:

5 a plurality of disk drive units;
6 a cache memory for storing portions of data stored on said disk drive units
7 that are read out from said disk drive units; and
8 a control unit for controlling reading out of data stored on said disk drive
9 units,

10 said control unit configured to:
11 obtain storage-device-access history information for each of said
12 computers;
13 store information in tabular form which identifies each of said computers
14 with its respective storage-device-access history information; and
15 pre-read data from said disk drive units for at least one of said computers
16 based on its respective storage-device-access history information.